DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01 December 2009 has been entered.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 5, 8, 11-15, 18, 21-24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barlow (4,219,072) in view of Stuecheli (GB 2,049,922) and Strahle et al (6,056,043).

Barlow discloses a heat storage unit (Fig. 6) including a storage container (12, 14, 16) that houses a heat storage body (86), which stores heat by a state change from solid to liquid (Fig. 7), a heat exchange medium (52) which exchanges heat by directly contacting the heat storage body (86), has a smaller specific gravity than that of the heat storage body and is separated from the heat storage body (Fig. 7), a supply pipe (18) that passes through at least the heat

storage body housed in the storage container and supplies and releases the heat exchange medium into the storage container (Fig. 6), a discharge pipe (46) that discharges the heat exchange medium, the supply pipe crosses a boundary surface between the heat exchange medium and the heat storage body (Fig. 6), has a plurality of discharge holes positioned inside the heat exchange medium (Fig. 7), the supply pipe crossing vertically with respect to the boundary surface (Fig. 7), at least a part of the supply pipe extending in the horizontal direction (Fig. 6), discharge holes being provided for an area extending in the horizontal direction such that the holes are open in the vertically downward direction (Fig. 9), the supply pipe having an expanded portion that widens toward the end (Fig. 7), the discharge pipe (46) includes a separation mechanism (94) that separates the heat storage body and the heat exchange medium, the supply pipe including a first supply pipe having discharge holes that discharge the supplied heat exchange medium into the heat storage body (Fig. 7), and a second supply pipe that crosses the boundary surface between the heat exchange medium and the heat storage body (Fig. 7), which are housed in the storage container, and has an outlet that discharges the supplied heat exchange medium into the heat exchange medium (Fig. 7), a switching valve (78, 80, 82, 84) for switching supply and cutoff of the heat exchange medium depending on the state of the heat storage body is provided severally for the first and second supply pipes (Fig. 7).

Barlow does not disclose at least part of the discharge pipe extending in a horizontal direction and the connection port of the supply pipe being positioned above a connection port of the discharge pipe.

Stuecheli discloses a heat storage device (Fig. 1) including at least part of a discharge pipe (18) extending in a horizontal direction and a connection port of the supply pipe (22) being positioned above a connection port of the discharge pipe (Fig. 1). While pipes 18 and 22 of Stuecheli are not connected to a heat exchanger, Steucheli also discloses pipes 32 and 38 which are connected to a heat exchanger (at 36) and which also include the discharge pipe (32) connected below the supply pipe (38). It would have been obvious in view of Stuecheli to provide at least part of the discharge pipe extending in a horizontal direction and the connection port of the supply pipe being positioned above a connection port of the discharge pipe in the heat storage device of Barlow, the motivation being to enable easier connection of the pipes to external connectors.

Barlow does not disclose the heat storage unit being transportable and a second supply pipe surrounding at least a part of the first supply pipe including the discharge holes and having a communication portion that guides the heat exchange medium to the discharge holes and the supply pipe provided on and covering the bottom surface of the container.

Strahle et al disclose a heat storage unit (see abstract) which is mounted in a vehicle (col. 1, line 66-col. 2, line 3) and thus is transportable and having a second supply pipe (94 in Fig. 14) surrounding at least a part of the first supply

pipe (90) including the discharge holes (92) and has a communication portion that guides the heat exchange medium to the discharge holes (96).

It would have been obvious in view of Strahle et al to provide such a supply distribution pipe in the heat storage unit of Barlow in view of Stuecheli, the motivation being to better distribute the input material and to mount a heat storage device as taught by Barlow in view of Stuecheli in a vehicle, the motivation being to enable reduction of energy use to storing and retrieving vehicle heat.

With regard to claims 23 and 24, it would have been obvious to one of ordinary skill in the art to position the supply pipe on the bottom surface of the container and covering the bottom surface, the motivation being to enable increased distribution of the input fluid.

4. Claims 1-4, 11, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Lindner et al (4,086,958) in view of Stuecheli (GB 2,049,922) and Strahle et al (6,056,043).

Lindner et al disclose a heat storage unit (Fig. 2), which is mounted in a vehicle (col. 1, line 66-col. 2, line 3) and thus is transportable, the heat storage unit including a storage container (21) that houses a heat storage body (22), which stores heat by a state change from solid to liquid (Fig. 3), a heat exchange medium (28) which exchanges heat by directly contacting the heat storage body (22), has a smaller specific gravity than that of the heat storage body and is

separated from the heat storage body (Fig. 3), a supply pipe (31, 33) that passes through at least the heat storage body housed in the storage container and supplied the heat exchange medium into the storage container (Fig. 2), a discharge pipe (29) that discharges the heat exchange medium, the supply pipe (33) crosses a boundary surface between the heat exchange medium and the heat storage body (Fig. 2), has a plurality of discharge holes positioned inside the heat exchange medium (Fig. 3), the supply pipe crossing vertically with respect to the boundary surface (Fig. 3), the supply pipe being disposed coaxially around the circumference of an area having the discharge holes (Fig. 3) and has a circulation pipe to allow the heat exchange medium discharged from the discharge holes to go up in the vertical direction (Fig. 3), at least a part of the supply pipe extending in the horizontal direction (Fig. 6), discharge holes being provided for an area extending in the horizontal direction such that the holes are open in the vertically downward direction (26 in Fig. 3), and a second supply pipe (33) that crosses the boundary surface between the heat exchange medium and the heat storage body (Fig. 2), which are housed in the storage container, and has an outlet that discharges the supplied heat exchange medium into the heat exchange medium (Fig. 2).

Lindner et al does not disclose the connection port of the supply pipe being positioned above a connection port of the discharge pipe.

Stuecheli discloses a heat storage device (Fig. 1) including a connection port of the supply pipe (22) being positioned above a connection port of the

discharge pipe (Fig. 1). While pipes 18 and 22 of Stuecheli are not connected to a heat exchanger, Steucheli also discloses pipes 32 and 38 which are connected to a heat exchanger (at 36) and which also include the discharge pipe (32) connected below the supply pipe (38). It would have been obvious in view of Stuecheli to provide a connection port of the supply pipe positioned above a connection port of the discharge pipe in the heat storage device of Lindner et al, the motivation being to enable easier connection of the pipes to external connectors.

Strahle et al discloses a heat storage device which is mounted in a vehicle (col. 1, line 66-col. 2, line 3) and thus is transportable.

It would have been obvious in view of Strahle et al to mount a heat storage device as taught by Lindner et al in view of Stuecheli in a vehicle, the motivation being to enable reduction of energy use to storing and retrieving vehicle heat.

5. Claims 10, 20, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barlow (4,219,072) in view of Stuecheli (GB 2,049,922) and Strahle et al (6,056,043) and further in view of Kakiuchi et al (5,785,885).

Barlow in view of Stuecheli and Strahle et al disclose a heat storage unit having the structure claimed, with the exception of the material of the heat storage body being erythritol. Kakiuchi et al teaches using erythritol as a heat storage material (see abstract). It would have been obvious in view of Kakiuchi

et al to use erythritol as the heat storage material in the heat storage unit of Barlow in view of Stuecheli and Strahle et al, since Kakiuchi et al teach that erythritol has improved heat storage characteristics.

6. Claims 7, 17, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barlow (4,219,072) in view of Stuecheli (GB 2,049,922) and Strahle et al (6,056,043) and further in view of Noji et al (4,953,330).

Barlow in view of Stuecheli and Strahle et al disclose a heat storage unit having the structure claimed, with the exception of vertical wave absorbing plates arranged in parallel. Noji et al teaches providing vertical wave absorbing plates in a liquid tank (Fig. 15). It would have been obvious in view of Noji et al to provide wave absorbing plates in the heat storage unit of Barlow in view of Stuecheli and Strahle et al, the motivation being to prevent splashing of the liquids.

7. Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barlow (4,219,072) in view of Stuecheli (GB 2,049,922)and Strahle et al (6,056,043) and further in view of Strasser (WO 03/019099)(cited by applicant).

Barlow in view of Stuecheli and Strahle et al disclose a heat storage unit having the structure claimed, with the exception of the structure of the separation mechanism. Strasser discloses a heat storage unit having a separation device (8) as claimed (Fig. 1). It would have been obvious in view of Strasser to provide

such a separation mechanism in the heat storage unit of Barlow in view of Stuecheli, the motivation being to prevent loss of the heat storage material.

8. Applicant's arguments filed 01 December 2009 have been fully considered but they are not persuasive.

Applicant argues that the applied references do not disclose the heat storage unit being transportable. This is incorrect. The Strahle et al (6,056,043) patent discloses mounting a heat storage unit in a vehicle, thus making it transportable. Note also that the term "transportable" is interpreted to mean that the device is capable of being transported, and that almost any device is capable of being transported by some means. During examination, the terms in a claim are given their broadest reasonable interpretation. If applicant intends the term “transportable” to require certain structure in the device, it is recommended that this structure be specified in the claims.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Teresa J. Walberg whose telephone number is 571-272-4790. The examiner can normally be reached on M-F 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Teresa J. Walberg/
Primary Examiner, Art Unit 3744

/TW/